

Mating Calls of Selected Sarawak Toads (Amphibia: Anura: Bufonidae) (Panggilan Pengawanan Kodok Sarawak Terpilih (Amfibia: Anura: Bufonidae))

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ABSTRACT

*The sound produced by the anurans including toads can be a survival strategy for the selection of fittest males by their conspecific females and a form of effective prezygotic mechanism. Most of the published works on anuran sound production were on true frogs or ranids, yet little is known about sound characteristics of toads. Here we describe the properties of mating calls from six selected toad species from six study sites in Sarawak. Males' mating calls were recorded and analyzed using SoundRuler Acoustic Analysis ver 0.9.6.0. Call characteristic were subsequently compared for toad species differentiation. The results showed that each species differ in call characteristics, with pulsating note, rate of note repetition and pitch being the most apparent characters. The highest number of pulse notes belongs to *Duttaphrynus melanostictus* while *Ansonia spinulifer* exhibited highest pitch and rate of note repetition. These species' differences in mating call characteristics provide an additional method for anuran species classification besides morphological and molecular DNA data. It is also a very useful guide during field survey as the sound is audible and identification can be made without the need of capturing the toads.*

Keywords: *Bufonidae; call characteristics; note repetition rate; pitch; pulsating note*

ABSTRAK

*Bunyi yang dihasilkan oleh Anura termasuk kodok merupakan satu strategi kemandirian spesies dalam pemilihan baka jantan oleh betina serta sebagai suatu mekanisme pemencilan pra-zigot yang berkesan. Kebanyakan kajian bunyi anuran yang telah diterbitkan adalah daripada kodok (ranid), namun sedikit sahaja yang diketahui tentang ciri akustik kodok. Kajian ini mencirikan panggilan mengawan daripada enam spesies kodok terpilih dari enam tapak kajian di Sarawak. Bunyi panggilan kodok jantan direkod dan dianalisis dengan menggunakan Analisis Akustik SoundRuler ver 0.9.6.0. Ciri panggilan itu kemudiannya dibandingkan antara spesies kodok yang berbeza. Keputusan kajian menunjukkan bahawa panggilan jantan setiap spesies berbeza daripada segi denyutan bunyi, kadar pengulangan nota bunyian dan pic. Kekerapan tertinggi nota denyutan dimiliki oleh *Duttaphrynus melanostictus* manakala *Ansonia spinulifer* mempunyai pic dan kekerapan kadar pengulangan nota bunyian yang tertinggi. Penentuan ciri panggilan adalah sangat penting kerana ia menyediakan satu pendekatan tambahan untuk pengelasan spesies anuran selain berdasarkan data morfologi dan molekul DNA. Ia juga amat berguna dalam kajian lapangan kerana bunyi boleh didengar dan dengan itu pengecaman spesies boleh dibuat tanpa penangkapan kodok.*

Kata kunci: *Bufonidae; ciri panggilan; kadar ulangan nota; nota denyut; pic*

INTRODUCTION

The sound produces by animals such as the advertisement call of a toad contains key information about species identity and an individual's motivation to reproduce and can be used for species discrimination (Ryan 2009). Animal sounds are variables due to selective pressures that may influence the acoustic signals such as frequency bands and temporal components for effective communication (Radford et al. 2014). In anurans, sexual selection is a strong force of evolution. This occurs in the form of female choice on call frequency where spectral call characteristics such as dominant frequency are important to frog evolution (Ryan 1986). Female frogs or toads recognize male of their own species in mating through male mating calls which play an important role in prezygotic isolating

mechanism (Dreher & Prohl 2014). Failure to mate might result in offspring reduction that eventually leads to local extinction. According to Feng and Ratnam (2000), females are attracted to the calls with proper temporal structure. Temporal call structure includes call duration and number of pulses, where call duration can be a reliable indicator of heritable genetic quality (Welch et al. 1998). Another important temporal characteristic is pulse rise time (Gerhardt & Huber 2002).

Since Sarawak consists of at least 150 species of frogs and toads (Inger & Stuebing 2005). However, little is known of the Sarawak Anuran's sounds to date except in Zainudin et al. (2012, 2010). Therefore, our main objective was to describe the acoustic sounds produced by selected species of male toads in Sarawak.